



## Risk factors for hypertension disease among a population in Al-Fasher City – Sudan

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### General Note



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### ABSTRACT

**Background:** Hypertension is the most significant risk factor for cardiovascular and kidney maladies and the main risk factor for mortality. **Aim:** To study the risk factors of hypertension among the adult population. **Methods:** This study was a descriptive cross-sectional community-based study conducted on adults (above 18 years) in Al-Fasher City between April and December. A cluster sampling technique was used to draw the study sample of 4325 participants. The data were collected using a standardized questionnaire with 22 ends closed questions. The collected data were analyzed using the statistical package for science (SPSS) version 23. The results were displayed as percentages, frequencies, and cross-tabulation. The statistical significance was tested using the Chi-Square test and the P-value is  $>0.05$ . **Results:** This study revealed that the prevalence of hypertension was 33% and supported evidence that hypertension increased as age increased. The prevalence of hypertension was higher among the age group above 55 years old (14.6%), and the percentage was higher among females compared to males. The risk factors significantly associated with hypertension were age, weight and obesity. **Conclusion:** This study revealed that hypertension increased as age increased, and it has also been shown that the risk factors associated with the disease are age, salt intake, and body mass index.

**Keywords:** Hypertension, Risk factors, Adult Population, Sudan

## 1. INTRODUCTION

Hypertension (HTN) is the most important risk factor of cardiovascular and kidney disease and a leading risk factor for mortality. At least 7.1 million people worldwide die each year as a consequence of hypertension and in 2016, nearly a billion -adults aged 25 years and older had hypertension, and three-quarters of this number were living in developing countries (Ninh et al., 2014). In sub-Saharan Africa, there are around 250,000 deaths each year. Regional differences in the prevalence of hypertension are within countries (Ninh et al., 2014). In Sudan, hypertension has a prevalence of 20.1%. Undiagnosed hypertension is detected in 38.2% of the population in two towns in Northern Sudan. For the rural population in Sudan, the hypertension prevalence is 23.3%, 19.9%, and 17.3% in central, northern, and eastern Sudan, respectively (Elhuda, 2016). The increase in the incidence of (HTN) is specifically caused by a combination of many parameters, including family history, change in lifestyle, dietary habits, and environmental factors (Fawzi et al., 2018). Nevertheless, a recent study showed an increased incidence of HTN in Sudan, which may result in serious health problems in the near future if no appropriate measures are taken (Fawzi et al., 2018). Some studies have claimed that the prevalence of HTN is a cause of a tremendous increase in renal insufficiency (Fawzi et al., 2018). Risk factors associated with hypertension are universally relevant, as demonstrated by the consistency of association in different populations (Serra et al., 2016).

## 2. MATERIALS AND METHODS

### Study design

Descriptive Cross Sectional-Community-Based.

### Study period

The study was conducted from April to December 2019.

### Study Area

The study was conducted in Al Fashir City, which is the capital city of North Darfur, Sudan.

### Study population

The target population of the study was the residents in the Al Fashir district. It was composed of different ethnic groups from all parts of Sudan, with a diversity of social-cultural contexts and beliefs, totaling a population of 252,609 residents in 450 housing units (World Population, 2015).

### Sample size

The sample size was calculated by using the standard formula: (Israel et al., 2016).

$n = N / (1 + N(D)^2)$ . n. Desirable sample size, N. Is the population size, D: is the degree of accuracy desired (the accepted margin of error and it is equal to 0.05).

$n = 252,609 / [1 + 252,609(0.05 \times 0.05)] \approx 4325$

### Sampling technique

Cluster sampling was used to estimate the desired sample size. Clusters were identified and every member of the cluster was a part of the study. Sample size was distributed in the overall study area. The area was divided geographically into clusters for verifying the boundaries of the sample area in order to ensure good coverage of the sample households. Total households were divided by a number of households in each cluster,  $450/25 = 18$  clusters. The sample size was divided by the number of households in each cluster to determine the number of clusters to cover the sample;  $400/25 = 16$  clusters. Cluster samples were selected with a simple random sampling technique and only two clusters were excluded from the sample (a total of 18 clusters). The entire elements from each of selected clusters were used (16 cluster).

### Data collection tools

Data was collected by using a standardized questionnaire with 22 ends closed end questions consisting of two parts; the first part was social and demographic data, while the second part included questions about hypertension aspects.

### Data collection technique

The researcher collected the data and participants underwent standard interviews for data that were obtained and recorded. A sample of 4325 participants was collected from 16 clusters. The survey was completed in a period of 25 days (morning to evening) in April, the year 2019. All available members in the house at the time of the survey were taken randomly. Approval and consent were taken from the participants in addition to blood pressure and body mass index. These factors were measured at the end of the interview.

### Inclusion criteria

Sudanese, both genders and hypertensive patients and non-hypertensive patients aged above 18 years.

### Exclusion criteria

Age less than 18, foreigners and pregnant women.

### Data analysis

The analysis of data was done using a computer package for science (SPSS) program version 23. After being pre-coded and pre-tested, the analysis was done by univariate analysis and was representative in percentage and frequency. Bivariate analysis was used and tested by Chi-Square and presented by cross-tabulation. A P value > 0.05 was considered significant.

## 3. RESULTS

Table 1 shown in this study, presented the socio-demographic characteristics are Twelve-point five percent of the participants were in the age of group 18-24 years. Twenty-four percent of the participants were in the age group 25-34 years. Thirty-one-point four percent of the participants were in the age group of 35-44 years. Fourteen-point five percent of the participants were aged more than 55 years results of the study show that the majority of the participants were female with 61.5% more than males 38.5%. As regards the educational level, 31.8% (96) of the study participants had a university-level education. Forty-seven percent (142) of the study participants were house wives, while 74.2% of the participants were married.

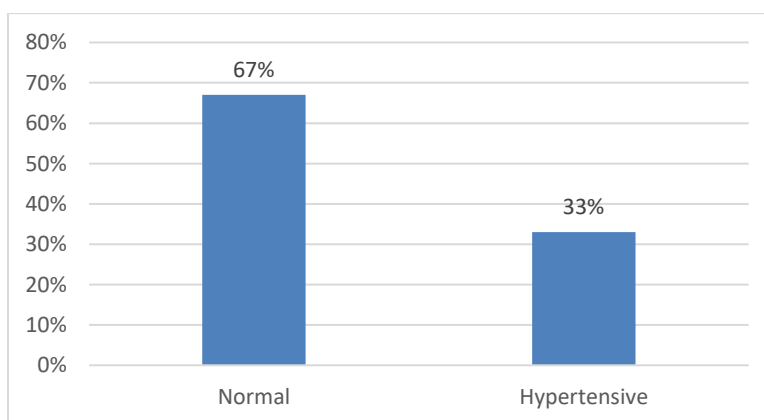
**Table 1** Sociodemographic characteristics of the study population (n= 4325)

Variables		Frequency n	Percentage %
Age groups	18-24 years	451	12.5%
	25-34 years	1038	24%
	35-44 years	1358	31.4%
	45-54 years	761	17.6%
	More than 55 years	627	14.5%
Gender	Male	1665	38.5%
	Female	2660	61.5%
Education level	Illiterate	670	15.5%
	Basic school	748	17.3%
	Intermediate	411	9.5%
	Secondary school	1025	23.7%
	University	1298	30%
	Postgraduate	173	4%
Occupation	Worker	843	19.5%
	Public employee	705	16.3%
	Privet sector employee	324	7.5%
	Housewife	1773	41%
	Student	247	5.7%
	Farmer	433	10%
	Marital status	Single	981

	Married	2695	62.3%
	Divorced	389	9%
	Widowed	260	6%

**Table 2** Relation of Risk factors for hypertension disease among of a study participant

hypertension in relation to age	Normal		Hypertensive		Chi-Square	P-value
	n	%	n	%		
18-24 years	368	8.5%	87	2%	1021.8 <sup>a</sup>	.000
25-34 years	899	20.8%	108	2.5%		
35-44 years	930	21.5%	246	5.7%		
45-54 years	476	11%	354	8.2%		
More than 55 years	225	5.2%	632	14.6%		
Total	2898	67%	1427	33%		
hypertension in relation to gender						
Male	813	18.8%	886	20.5%	464.4 <sup>a</sup>	.000
Female	2085	48.2%	541	12.5%		
Total	2898	67%	1427	33%		
hypertension in relation toobesity and overweight						
Underweight less than 18.5	87	2%	173	4%	527.8 <sup>a</sup>	.000
Normal 18.5-24.9	796	18.4%	108	2.5%		
Overweight 25-29.9	1081	25%	324	7.5%		
Obesity	934	21.6%	822	19%		
Total	2898	67%	1427	33%		
hypertension in relation to family history of hypertension among the study population						
Yes	1354	31.3%	921	21.3%	121.8 <sup>a</sup>	.000
No	1544	35.7%	506	11.7%		
Total	2898	67%	1427	33%		
hypertension in relation to physical activity among the study population						
Yes	1038	24%	657	15.2%	4325 <sup>a</sup>	.000
No	1860	43%	770	17.8%		
Total	2898	67%	1427	33%		



**Figure 1** Prevalence of hypertension among the study population

Table 2 Showed overall the relation of risk factors for hypertension disease among a study participant showed insignificance high prevalence ( $P$ -value  $>.000$ ). Also shown in hypertension in relation to age a higher significance prevalence (14.6%) of hypertension was found among the age group of more than 55 years ( $P$ -value  $>.000$ ). Figure 1 showed a higher significance prevalence (33%) of hypertension was found among the study population.

#### 4. DISCUSSION

This study sets out to answer the following research questions: First, what is the prevalence of hypertension among the study population? Second, what are the risk factors related to hypertension and lifestyle among the population aged above 18 years? In this study, the socio-demographic characteristics are shown in Table 1, which shows that the majority of the participants were female with 61.5% more than males 38.5%. This result is similar to a study done in China found the Hypertension was more prevalent among men than women (31.63% vs. 27.03%) (Zhen et al., 2018). Twelve-point five percent of the participants were in the age of group 18-24 years. Twenty-four percent of the participants were in the age group 25-34 years. Thirty-one-point four percent of the participants were in the age group of 35-44 years. Fourteen-point five percent of the participants were aged more than 55 years. This result was supported by the result of a study that was found to be similar to the above age distributions and age group 35-44 years it was 35% (Shikha et al., 2017).

This study revealed that the rate of hypertension was 39.8%. The rates of hypertension cases increase with increasing age. Therefore, we can expect to see more cases of hypertension with increasing age (Linda et al., 2015). This result supported the evidence that hypertension increased as age increased. Regarding the relation of hypertension and gender, the result of the present study showed there was a difference in the prevalence of hypertension, among female gender 12%, male gender, 20.5%, with significant difference associated with  $P$  value=0.000 and Chi-Square=464.4a (shown in Table 2). This result was supported by (Muhammad & Wanpen, 2017). It was found that the difference between genders evidenced by the effect of estrogen on blood pressure remains controversial (Muhammad & Wanpen, 2017).

A higher significance prevalence of hypertension (14.6%) was observed among the age group of more than 55 years. In this study, age is significantly associated with hypertension  $P$  value= .000 (shown in Table 2). This result is similar to the result of a study conducted by (Guchiye, 2014) it was found that hypertension disease increases with age. About the relation of hypertension and obesity, this study revealed that obesity is widely found in hypertension patients, 19%, which are known risk factors in hypertension and other lifestyle-related diseases. In the present study, a statistically significant association was found between hypertension in relation to being obese, with  $P$  value= .000 and a Chi- Square=527.8a. This result was supported by a study conducted by (Singh et al., 2017) which reported a positive relationship between hypertension and body mass index. Regarding the relation of hypertension and a family history of hypertension among the study population, the result revealed that family history presents in 21.3% was insignificantly associated with hypertension,  $P$  value= .000, Chi-Square=121.8a (shown in Table 2). This result is supported by (Manandhar & Raman, 2016) found a significant association with hypertension and family history of hypertension 33%.

Regarding the relation of hypertension and physical activity among the study population, this study revealed that the prevalence of hypertension in 15.2% of patients was significantly associated with physical activity, with a  $P$  value= .000 and a Chi-Square=4325a shown in Table 2. These results are consistent with the findings of another study done by (Zekewos et al., 2019) found a relationship between physical activity and hypertension is found that people who exercise sports less prone to hypertension.

#### Limitation of the study

The study sample came only from specific areas in Sudan. Accordingly, the findings of this study may not represent the situation at all levels of the cities in the country.

#### 5. CONCLUSION

This study revealed that hypertension increased as age increased. It has also been shown that the risk factors associated with the disease are age, salt intake, and body mass index.

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### Contributions

A.A. Jarelnape designed the study, supervised the data acquisition, analyzed and interpreted the data, and wrote the manuscript. W.E. Sagiron took part in the analysis and drafting of the manuscript. H.S. Habib participated in the data collection

### Funding

This study has not received any external funding.

### Conflict of interest

There is no conflict of interest to declare.

### Ethical approval for study protocol, study design, methodology

The study was approved by the Medical Ethics Committee of the ministry of health El Fasher, Sudan February-2019 (ethical approval code: EC-0013.MOH-S/2019).

### Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study.

### Data and materials availability

All data associated with this study are present in the paper.

### Peer-review

External peer-review was done through double-blind method.

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